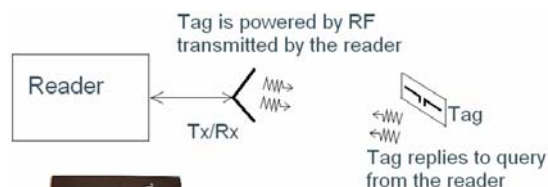


### BACKGROUND

#### How UHF RFID works



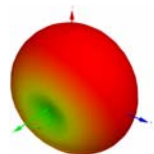
- ◆ Passive UHF RFID operates between 860-960 MHz worldwide, North America 902-928 MHz
- ◆ Tag powered by radiation from the reader
- ◆ Communication by backscatter modulation

#### How materials affect performance

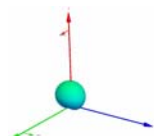
- ◆ Materials changes critical antenna properties

Air Plastic Glass Water Metal

Easier ← → Harder



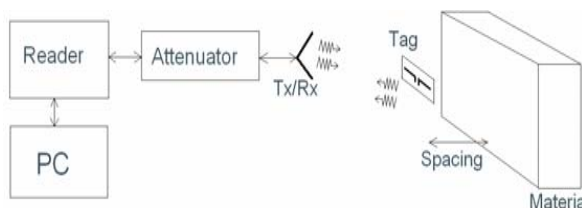
Air



Near Metal

- ◆ Alien Squiggle in air readable at 12 ft
- ◆ On glass, 8 ft

### INTERACTIVE DEMONSTRATION



1. Choose a Tag
  - ◆ Avery Dennison AD-210
  - ◆ Alien 9338 "Squiggle"
  - ◆ Texas Instruments Gen 2
  - ◆ Metal Mount Tag (MMT)
2. Define spacing
  - ◆ Directly on the material
  - ◆ Thin cardboard (3.12mm)
  - ◆ Thick cardboard (6.16 mm)
3. Choose material
  - ◆ Plastic
  - ◆ Water
  - ◆ Metal
4. Change attenuation to simulate distance

Attenuation (dB)	4	6	8	10	12	14	18
Distance (ft)	4.6	5.9	7.4	9.3	11.7	14.7	18.5

#### Things to look for

- ◆ Materials vary in impact of performance
- ◆ Greater separation generally improves performance
- ◆ Performance on metal is most challenging
- ◆ The Metal Mount Tag (MMT) works equally well on all materials

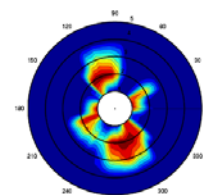
Daniel D. Deavours, Director of Research  
RFID Alliance Lab, ITTC, University of Kansas.  
<http://www.rfidalliancelab.org> deavours@ittc.ku.edu

### ALLIANCE LAB SERVICES

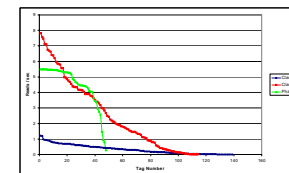
#### Capabilities

The RFID Alliance Lab can evaluate:

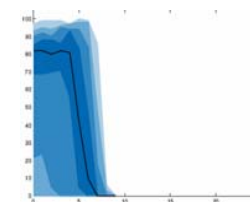
- ◆ Frequency Dependence
- ◆ Radiation Pattern
- ◆ Read rates
- ◆ Performance near materials
- ◆ Variance and yield
- ◆ Tag placement
- ◆ Reader performance



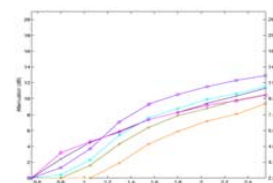
Radiation Pattern



Read rates in population



Variance



Near water

#### Under Development

- ◆ Impact
- ◆ Abrasion
- ◆ Scraping
- ◆ Electrostatic Discharge (ESD)

*The "Metal Mount Tag" works equally well on any material*

- ◆ High Performance Antenna Design
- ◆ High performance, low cost, flexible substrate
- ◆ Includes metal back plane
- ◆ Material costs less than \$1
- ◆ Patents pending

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